NEWS SCIENCE NEWS

— THE VEIL IS TEARING — Half of the Universe is Missing!

by Jean-Pierre Petit © 2002
Introduction and translation
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Introduction

As explained and colourfully illustrated by Jean-Pierre Petit in his book *We've Lost Half of the Universe* (*On a Perdu la Moitié de l'Univers*, published by Albin Michel, 1997), astrophysicists the world over have a problem.

In accordance with the total quantity of observable matter contained in the universe, galaxies should fly open and scatter their stars all over space, so that the sky should appear to us like one of those wallpapers with evenly spread little motifs. This, however, is far from being the case, since enormous "empty" space appears between compact galaxies. One half of the universe seems to be missing, which would be responsible for the confinement of galaxies or clusters of galaxies.

The world's scientific establishment's generally accepted hypothesis is that the empty space is filled with "cold dark matter"—dark being too cold to form visible stars. This hypothesis, however, fails to produce a satisfactory explanation for the observed abnormal deceleration of the two NASA space probes *Pioneer X* and *XI*—especially *Pioneer X*, which has now reached the confines of our solar system.

In the course of a recent symposium in Marseille, France, Jean-Pierre Petit attempted to present another model of a universe. There might be a second universe, made up of "shadow" matter (neither cold nor dark), which would repel ours and would confine all that we see into the interstitial space left between large bubbles of void. Both universes would be interrelated only through gravity—light would not pass—but in opposite directions, the one repulsing the other. And this would explain *Pioneer X*'s behaviour.

Unfortunately, this new model was not as much as considered during the symposium—simply because the announced subject of the meeting related to "dark matter", and anything which diverged from the generally accepted hypothesis was considered beside the point. Even top research scientists are often routine-minded and little prone to call themselves into question.

Space Probes' Abnormal Behaviour

In 1972 and 1973, the United States launched a couple of space probes, *Pioneer X* and *XI*. These objects are important evidence of human adventure, and for several years they have been travelling beyond the confines of the solar system.

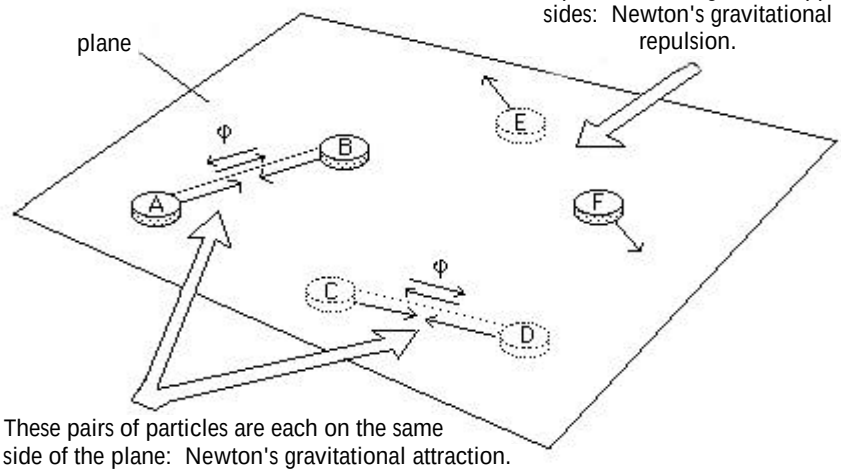
Astronomers usually do their surveying with the help of a unit of length which is the mean Earth-to-Sun distance, called an "astronomical unit" (AU). If you wish to compare this to something quite Earthly, it would equal 93,399,750 statute miles. Is this of any help to you? I could as well have written one million or one trillion—you would have taken it for granted. By definition, the Earth is one AU distant from the Sun; Jupiter is at 5.2, Saturn 9.55, Neptune 30 and Pluto 40.

The probes are now at 60 AU from the Sun—in other words, well beyond the limits of the solar system—and they are careering away at a speed of five kilometres per second (3.1 miles per second). They have been followed ever since they left the Earth. Because they were intended to draw ever farther away from the Sun, there could have been no question of powering them with energy gathered through solar panels. They are therefore both equipped with isotopic generators.

A few years ago, one of the probes ceased emitting; the other one is still sending us feeble signals. But the important fact is that for over 30 years, thanks to the Doppler effect, we have been able to measure their speed with exceptional accuracy.

Do you remember what was done as soon as the first satellites were sent orbiting around the Earth? Using radioelectrical signals, measurements were taken which instantly revealed the speed at which America was shifting away from good old Europe. Wegener would have been pleased. Alas, the inventor of the theory of continental shifting died long ago.

When astronauts set foot on the Moon, what did they do? They set up a mirror on the Moon's surface in order to reflect a laser beam sent from Earth, allowing accurate measurements to be made. The immediate result: it was discovered that the Moon draws away from the Earth at a rate of four centimetres (1.575 inches) per year—this, again, thanks to the Doppler effect and its uncanny accuracy. So don't



be surprised that it has been possible to measure the speed of the probes with such incredible precision at such enormous distances, and that this has been done and recorded year after year with the same accuracy.

The probes have left the solar system on the momentum they have gathered using the "slingshot effect", as they received some energy cruising off Jupiter. The Sun, however, is still exerting its attraction over them, making them slow down very gradually. The energy they had received when they reached the limits of the solar system was nonetheless sufficient to allow them to leave us forever, the slowing down due to the Sun's attraction being very slight.

But astronomers became aware that, strangely, the probes were slowing down too much. The probes showed an abnormal loss of speed of 2.5 centimetres (one inch) per second per year, the accuracy tolerance of this measurement being ±4%. If the space probes were abnormally slowing down, this had to be due to a force acting upon them which had so far not been reckoned with.

Research was led in all directions. Could it have been some effect of one or other of the planets in the solar system? Immediately rejected. Some braking effect linked with the interplanetary environment? Nor could this be accepted.

Astrophysicists then wondered whether our solar system might include some ingredient which escaped observation—a "hidden mass", which today is called "dark matter". This mysterious matter could not be strewn in any haphazard way; it had to take into account one reliable observation: the probes' deceleration had remained practically constant since they had passed the orbit of Pluto, at a distance of 40 AU, i.e., 40 times the Sun–Earth distance.

Whatever the theoretical argument, this data implied that the amount of dark matter—if such were indeed the cause of the deceleration—contained in the solar system should exceed one ten-thousandth part of the mass of the Sun. This seems very little. But our planetary system functions like a Swiss watch.

For instance, do you realise that we know the position of a planet, such as the Earth, at any instant to within about 66 feet? This is thanks to data gathered from all the satellites which have been launched over many years.

Formerly, astronomers working at the Bureau des Longitudes (the French centre of calculation and publisher of an ephemeris) computed the position of heavenly bodies by hand. Today, this is done by NASA with the help of powerful computers.

As a result, we know that the total mass present in the solar system could not exceed one millionth of that of the Sun, because otherwise this would give rise to predictions which would disagree with observations, hence with the ephemeris. Eclipses, star occultations, etc. would miss their appointed occurrence. Therefore, the dark matter, this *deus ex machina* of modern times, cannot be called upon to explain the deceleration.

By no means discouraged, our theoreticians then considered one ultimate move: to tamper with Newton's law of gravitation and add to it one corrective term.

The universe has a "reverse side", a kind of invisible double.

Classically, two bodies attract each other with a force varying as the product of their masses and inversely as the square of the distance between them. Empirically, the idea was to add one term, small enough to justify the fact that it had hitherto not been detected by observation, but sufficient to allow for an explanation of the effects on the space probes.

Unfortunately, some spoilsport immediately suggested recomputing the orbits of our familiar planets, Mars, Venus or simply the Earth, with this "revised" Newton's law. But remember: the position of the planets is known precisely to within less than 70 feet—and that is where everything went wrong.

One commentator, in an article in a 1998 issue of *Physical Review*, wrote: "Newton's law ceased to be universal; it acted differently according to whether it was applied to a small space probe, an asteroid or a planet."

A Double Universe Model

Why am I telling you this story? Because, for a quarter of a century, I have been working on a model of the universe, which was initially proposed by Andrei Sakharov, in which the cosmos is double. I have written a book on this, entitled *On a Perdu la Moitié de l'Univers* (*We've Lost Half of the Universe*).

What would a double universe look like? Specialists in general relativity will tell you they like considering the universe as a "hyperplane" which could possess a curvature, variable from place to place. Simply imagine that this hyperplane has a right side and a reverse side. When you look at one side of a surface, you can immediately visualise the adjacent location on the other side. Therefore you can imagine how two groups of objects, located on opposite sides, could interact without coming into contact with or even in sight of each other.

Imagine such a plane and, on one side, magnets which can be moved about. These interact with each other, but they can also interact with invisible magnets placed on the opposite side of the plane. The "twin matter" is thus represented by the magnets on the reverse side of the universe. We cannot see it. No particle of matter can collide with a particle of "twin matter", simply because the particles from one side do not communicate with those of the other side, be it through electromagnetic force, strong interaction or weak interaction. What then have we left? Gravitation.

I have worked for more than 20 years on this. The more concerned reader will find plenty of information of various levels on my website, http://www.jp-petit.com. Many pages illustrate this matter with considerable effort in popularisation.

In June 2001, at an international astrophysics congress in Marseille, entitled "Where is the Matter?", I presented this research. The full text of my paper can also be found on my website at http://www.jp-petit.com/science/colloque2001/Colloque_2001_1.htm.

It is hardly possible, here, to go into the details of this model. Any concept of the universe we might develop must be expressed through a model which will allow processes to be deciphered. Up to now, our only concept and therefore model of the universe has been that of a "mono-universe". As long as we remain within

distances of such small scale as that of the solar system, we are in a "non-relativist" configuration; the space curvature is extremely feeble and the expansion of the universe insignificant. In these conditions, Einstein's equation boils down to a Newtonian dynamic.

However, the measurements applied to the probes reveal that something is going wrong. Everything, I tell you, has been looked up, and yet, up to now, research has only concluded that we are in the presence of an "unmodelled acceleration"—in other words, the observed deceleration does not fit into the present model. This is not just a minor problem; it is one of the most important problems we are up against today and it cannot be ignored. To find a flaw in Newton's law is by no means trivial.

So, what am I suggesting? The universe has a "reverse side", a kind of invisible double. Filled with what? With "twin matter" similar to ours. The duality of "matter-antimatter" exists also in that universe, our twin. And particles in that other universe also attract each other according to Newton's law. I said that both universes interacted only through gravitation; but matter and twin matter repel each other, obeying a law which might be called "anti-Newton". This entails a number of consequences, which are described in *On a Perdu la Moitié de l'Univers*. It also throws some light on the space probes' behaviour.

If matter and twin matter repel each other, they must share the available space, and this is then the case for the whole universe at any scale, as we shall see further on. This means that between the stars, our Sun being one such, there is twin matter in a very rarefied state. The density is feeble, but the temperature is very high—over 160,000°C.

And here we have a real model with beautiful, predictive equations. Here we no longer satisfy ourselves with appearances, with tailor-made computer modellings such as those produced by a couple of researchers at the observatory where I work. They are both already going grey and have been tinkling away on their machines for the last 20 years with little or no result. They sprinkle "halos of dark matter" over our galaxies in an attempt empirically to take into account increasingly accurate incoming observational data. In the beginning, people said, "When our machines are more powerful, then..." But when there is a shortage of ideas, computers do nothing but a constant, dismal patch-up; they do not compensate for a lack of epic inspiration.

A Disappointing Symposium

Last June [2001], I attended an international scientific symposium. One Italian astronomer showed us the latest large-scale image of the structure of the universe.

As everyone knows, observations are progressing rapidly. Well done, astronomers! Not so long ago, we had the five-metre Mount Palomar telescope. Today, the Keck is double that size and there are 8.5-metre telescopes galore. In Hawaii, the French and Canadians have set up something splendid: the eyes of the world. Adaptive optics is the key to this technological breakthrough.

Formerly, mirrors had to be hewed and polished, which took years; their shape depended on their rigidity, hence their considerable weight. Grandpa's mirrors were compartmentalised structures which had to be cooled down slowly to avoid splitting, and polished many years until they were accurate to within a micron—and the result could be a success or a failure. In Zelentchouk, the Russians carved a six-metre one—alas, rather a failure.

Today, large mirrors are equipped with micro-jacks and they function like your eye. The shape of the crystalline lens of the eye is constantly adapted by a complex set of muscles. They are monitored by the retina until, by trial and error, the image is clear. The new telescopes are also adaptable and can be gauged on a reference target.

And, by the way, who do you think funded this? (Astronomers aren't talkative on this issue.) The military, as usual—mainspring of scientific "progress" (for "Star Wars" beam weapons). Mirrors of 100 metres in diameter are already in the blueprint stage; they will "see" 20 times farther than the Palomar telescope can. In short, we shall look the confines of the cosmos straight in the eye with a magnifying glass, which implies looking into its remotest past, because looking far equals looking "ancient". However, the explosively expanding technology does not always imply an equal expansion of grey matter.

At the symposium, the wonderful pictures of the large-scale structure of the universe displayed by the Italian revealed empty spaces. There is constant evidence that galaxies cluster around void bubbles of about 100 million light years in diameter. But computer simulations, though based on cold dark matter, produce strands, like a kind of spider's web.

I said, "Dear colleague, aren't you troubled by the fact that the result of simulations doesn't seem to match observations?"

Silence.

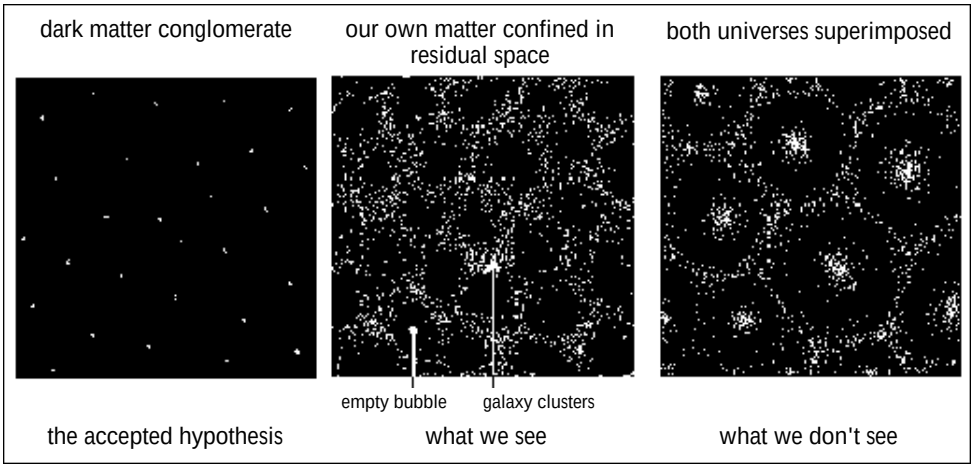
Yet, simulations we have been conducting since 1993 match perfectly with the empty bubbles structure; and besides, this structure appears to remain stable over about 10 billion years.

But this is not the current fashion. People can accept "dark matter", but "another universe" seems too complicated for today's theoreticians.

During the symposium, an American woman showed attempts to simulate proto-galaxies—as usual, of course, on a "dark matter" basis. Unfortunately, these galaxies would not rotate.

One of the participants remarked: "We seem to have another problem here."

The American had simply forgotten that galaxies were probably formed at a time



when the universe was so young (100 million years) that it was "smaller". The distances between galaxies were 28 times shorter; they were nearly in contact. It was a collisional system, and frequent collisions produced whirling. Today there are still "interacting galaxies", but it is a rarer phenomenon. The cosmos has expanded. But the American admitted she knew nothing about cosmology. She had no original ideas; she relied on her computer.

Dark matter is nowadays the accepted answer to all problems: the confinement of galaxies and the governing factor in their formation. And even though it doesn't seem to work very well, it is also supposed to explain the large-scale structure of the universe. Dark matter is also presumed responsible for the strong gravitational lens effects which have been observed. And here we have a fact: multiple images of galaxies which have been observed in the background, behind clusters of galaxies, could not have been formed by the latter, whose mass is 10 to 100 times too small. So astrophysicists take it as unquestionable evidence of the existence of dark matter.

French journalist Augereau had an article published in the March 17, 2000 issue of *Le Monde*, running with the headline: "Dark matter exists, since it deviates light rays". With it was shown a colour picture, meant to be a scientific scoop, of a 3D topography of this dark matter obtained by decoding the "weak lensing" effects, which produced deformed images of galaxies. Meillier and Fort, both of the Paris Astrophysics Institute, were the authors of this map. But a year later, in an interview for the magazine *Ciel et Espace*, Fort conceded to some embarrassment.

The map-making method had apparently revealed the existence of two extremely massive objects equivalent to several thousands of galaxies (comparable to the largest known cluster of galaxies, the Coma cluster). Yet, from that region, nothing was visible, absolutely nothing: not visible light, not infrared, not X-rays (clusters are powerful X-ray sources).

As a conclusion, Fort questioned: "...could it be 'dark clusters' exclusively made up of 'exotic matter'?" A magic matter, producing a gravitational lens effect that would therefore behave as positive mass, though without allowing ordinary matter to exist therein.

In June [2001], Meillier admitted the discovery of a third such cluster. He had only just asserted his confidence in the reliability of his map-making method when, confronted with the problem, he mumbled: "I don't believe in these dark clusters."

I returned very perplexed from the symposium.

Twin Matter or Photon Interactions?

But let us come back to the space probes. Consider the situation: for the first time, because of the "Swiss watch" mechanical precision of the solar system, the *deus ex machina* of contemporary astrophysics (dark matter) doesn't work. Another explanation must be found.

In my model, twin matter infiltrates everywhere where there is no ordinary matter (and vice-versa, since they repel each other), and it can be deduced that a quantity of twin matter equal to 0.0000000001 grams per cubic centimetre should exist between the stars. The Sun (and neighbouring stars) should repel this twin matter to a certain distance.

My calculations show that the Sun should repel twin matter outside a "bubble" whose radius is close to the distance from the Sun to Jupiter. Beyond this, the probes would be struggling against the repulsion due to this environment. In their present position, this force should be as near as constant, which is confirmed by observation.

My friend and colleague Norman Molhant (a Canadian) and I are at present working on data referring to distances between 5 and 30 AU beyond the orbit of Jupiter. Nearer to this, data cannot be exploited because radiation pressure screens the signal (the probes, with their huge dish-shaped antennas, are very sensitive). By developing this data (which, notwithstanding the fact that the "dark matter" option leads nowhere, no one has done up to now), we should be able to refine our model in order to be able to make predictions about this force for distances closer to the Sun (it takes two years to reach Mars and five to reach Jupiter).

In order to avoid radiation pressure due to the Sun's nearness from interfering with measurements, one could, for instance, position mirrors on massive objects, such as one of the satellites of Mars, and make reflected laser beam measurements. Then, when the orbiting satellite is on a course away from the Sun, a slight deceleration should be noted; and the opposite when on a course towards the Sun.

In this research, we have two competitors: the Australians, Foot and Volkas (*Physical Review*, June 2001). Their hobby-horse is a "mirror universe", but it contains positive mass. Thus, even supposing our universe should contain "mirror matter" equally as invisible as our "twin matter", we would still sit with the problem of compatibility with ephemeris predictions. So Foot and Volkas evoke a "photon–photon interaction" and describe a friction-like action, a sort of drag affecting the probes in this invisible environment. Why not? If ever the above-mentioned mirrors are installed, we shall instantly know who is right. If they are, the drag will at all times be opposite to the satellite's course, whether it be nearing the Sun or drawing away from it. If such is not the case, then only our model will remain in contention.

If any breakthrough is to be obtained in the realm of cosmology, it could very likely be thanks to local observations—as has been the case since 1917 with general relativity—for example, the gain of Mercury's perihelion and the diversion of light rays near the Sun, observed during a coronal eclipse. ∞

About the Author:

Jean-Pierre Petit was born in 1937. He graduated from the Ecole Nationale Supérieure de l'Aéronautique in Paris in 1961. He began his career at the CNRS (Centre National de Recherche Scientifique) in 1965. He presented a doctoral thesis in 1972. Assigned to the Institute for Fluid Mechanics in Marseille, he conducted theoretical and experimental research on MHD (magnetohydrodynamics). In 1967, a "bitemperature" generator was successfully tested and plasma acceleration was obtained in an MHD nozzle at exhaust speeds of up to 8 km/s, with annihilation of Velikhov's instability (the key to present military MHD applications). He is currently a Director of Research for the CNRS at the Astrophysics Laboratory in Marseille.

Dr Petit has written 30 books, three of them relating to the UFO problem (*Investigation on UFOs*, *Investigation on ETs who are Already Among Us*, *The Ummite Mystery*, published by Albin Michel). Other titles include *The Devil's Children*, on the relationship between scientists and the military, and *We've Lost Half of the Universe*, which has bearing on research in astrophysics and cosmology. He has also written 19 science popularisation cartoons which have been translated into eight languages.

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